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Respectfully submitted,

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[0013] The first step in carbonization in the kiln is drying out of the wood at 100°C or below to zero moisture content. The temperature of the oven dry wood is then raised to about 280°C. The energy for these steps comes from partial combustion of some of the wood charged to the kiln or pit and it is an energy absorbing or endothermic reaction.

[0014] When the wood is dry and heated to around 280°C, it begins to spontaneously break down to produce charcoal plus water vapor, methanol, acetic acid and more complex chemicals, chiefly in the form of tars and non-condensable gas consisting mainly of hydrogen, carbon monoxide and carbon dioxide. Air is admitted to the carbonizing kiln or pit to allow some wood to be burned and the nitrogen from this air will also be present in the gas. The oxygen of the air is used up in burning part of the wood charged.

[0015] The spontaneous breakdown or carbonization of the wood above a temperature of 280°C liberates energy and hence this reaction is said to be exothermic. This process of spontaneous breakdown or carbonization continues until only the carbonized residue called charcoal remains. Unless further external heat is provided, the process stops and the temperature reaches a maximum of about 400°C. This charcoal, however, will still contain appreciable amounts of tarry residue, together with the ash of the original wood. The ~~ash~~ content of the charcoal is about 3 to 5%; the tarry residue may amount to about 30% by weight and the balance is fixed carbon - about 65 to 70%. Further, heating increases the fixed carbon content by driving off and decomposing more of the tars. A temperature of 500°C gives a typical fixed carbon content of about 85% and a volatile content of about 10%. The yield of charcoal at this temperature is about 33% of the weight of the oven dry

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